

Appendix P

Manzano Storage Facility

The *Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (Pantex EIS) analyzed the storage of plutonium (Pu) in a pit form. Under the Pit Storage Relocation Alternative in the Pantex EIS, the pit storage function currently carried out at Pantex Plant (Pantex) would be transferred to another site. The Manzano Weapons Storage Area (WSA) at the Kirtland Air Force Base (KAFB) near Albuquerque, NM, is one of the candidate sites for the storage of pits. The WSA represented a reasonable alternative for this mission because the pits to be potentially relocated from Pantex exist in a sealed and stable metal form and will be packaged in specially designed containers that will ensure a very low probability of breach, metal oxidation, and dispersion of oxidation products. Therefore, the Manzano WSA was considered in the Draft Programmatic Environmental Impact Statement (PEIS) but eliminated as a reasonable alternative primarily because Manzano WSA could not accommodate storage of both pit and non-pit materials.

Since the issuance of the Draft PEIS, the Department of Energy (DOE) has developed a Preferred Alternative for storage that would separate storage of most Pu pits from storage of non-pit Pu material. Specifically, the Preferred Alternative would store Pu pits from Pantex and Rocky Flats Environmental Technology Site (RFETS) at Pantex, and would store non-pit Pu at Savannah River Site, Hanford Site, and Idaho National Engineering Laboratory. Since DOE's Preferred Alternative would separately locate storage of pits and non-pit Pu from RFETS, the option to store pits at Manzano WSA no longer appears unreasonable. Therefore, DOE has added this appendix to the Final PEIS, which discusses potential storage of Pantex and RFETS pits at Manzano WSA.

For a number of reasons, the Preferred Alternative would store the pits from Pantex and RFETS at Pantex, rather than Manzano WSA. Pantex is the proposed site for interim storage of pits under the Preferred Alternative in the Pantex EIS.¹ The majority of the pits that require storage are surplus to U.S. defense needs and are already located at Pantex. The number of pits that would be relocated from RFETS would be small by comparison. Since the majority of pits are already in storage at Pantex, it would be prudent for DOE to consolidate all pits there for storage. Assembly and disassembly operations would continue at Pantex even if pit storage did not occur there. Selecting Manzano WSA would require DOE to create another site where Pu would be located with the risk of contamination and the associated costs for site infrastructure and security. In addition, other missions that could be added to Pantex (for example, pit disassembly/conversion or mixed oxide fuel fabrication) could not be added to Manzano.

Storage at Manzano WSA would involve the transportation risk of moving these materials from Pantex to Manzano WSA. Furthermore, two shipment campaigns would be required for disposition for most of the pits (those already at Pantex) if Manzano WSA were chosen, whereas only one shipment campaign of those same pits would be required if the pits were stored at Pantex. For the Manzano case, pits at Pantex would require relocation to Manzano and then a second shipment campaign to a disposition site. Leaving the pits in storage at Pantex would result in only one shipment campaign from Pantex to the disposition site.² This appendix incorporates applicable information from the Pantex EIS.

¹ The disposition of these surplus pits would begin within the next 10 years and would be completed within the next 25 years. The time period required for the storage of the pits is therefore close to that considered in the Pantex EIS for pit storage and the reasons for not using Manzano WSA are the same.

² Two shipment campaigns of pits would be required for those pits currently stored at RFETS for both Pantex and Manzano.

P.1 MANZANO WEAPONS STORAGE AREA

The KAFB is an Air Force Materiel Command base sharing base facilities and infrastructure with a number of major tenants, including DOE, Sandia National Laboratories (SNL), the Defense Special Weapons Agency, and Phillips Laboratory (Figure P.1-1). The base covers an area of 21,320 hectares (ha) (52,600 acres) on the southeast boundary of Albuquerque, New Mexico. Approximately 8,300 ha (20,500 acres) of this area is withdrawn public lands (USAF 1993a:1-3). Major Air Force units at KAFB include the 377th Air Base Wing, 58th Special Operations Wing (which performs helicopter crew training and pararescue training) and Phillips Laboratory (which performs research and development for space systems, ballistic missiles, geophysics, and directed energy systems). SNL conducts research and development for space systems, testing, stockpile surveillance, and the transportation of nuclear materials (USAF 1993a:3-2).

The Manzano WSA at KAFB consists of four plants inside Manzano Mountain (used primarily for research activities) and 122 magazines, of which 81 are earth covered and 41 are tunneled into the mountainside (KAFB 1993a:13) (Figure P.1-2). Construction began in June 1947, and the facility became operational in April 1950. In June 1992, the Manzano WSA was deactivated, and Phillips Laboratory assumed responsibility for its maintenance. SNL continues to provide minimum security, although the Perimeter Intrusion Detection and Alarm System was deactivated with the termination of the main mission in 1992. The Manzano WSA has enough magazine space to store the pits from Pantex and RFETS. The proposed location for the storage of pits is the set of 41 magazines that are tunneled into the mountainside. As many as 35 magazines have overburden greater than 9 meters (m) (30 feet [ft]) of earth and granite. The existing fence would be reactivated to the extent necessary, and no new fence or security systems would be required. If in the Pantex EIS, DOE chooses to do storage of pits in the Manzano WSA at KAFB, a pit placement, retrieval, and inventory system would have been implemented. The storage areas at the Manzano WSA are well suited for the Stage Right equipment and techniques successfully implemented at Pantex Plant.

P.2 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

The environmental resources discussed below have been assessed for KAFB. Analyses have shown that the impacts to some resources from the potential storage of pits at the Manzano WSA are small enough to warrant only limited discussion. Therefore, the resources are discussed commensurate with their impacts.

P.2.1 LAND RESOURCES

The Manzano WSA is currently being used in part for storage of a variety of items such as furniture and document boxes. These items would easily be removed and space made available for storage of surplus pits. The use of some storage magazines for the storage of pits would not change the array of potential storage materials for which these weapon storage magazines are designed. Additionally, no land disturbance is projected as it pertains to the Manzano WSA. Impacts to land use would not be expected.

P.2.2 SITE INFRASTRUCTURE

The KAFB infrastructure is managed by the 377th Air Base Wing and includes support to all tenants. As the Manzano WSA is not a DOE site, the exact breakdown of infrastructure support activities that would be performed by KAFB and DOE personnel has yet to be worked out in detail. Should this site be selected for pit storage, a Memorandum of Understanding between the Department of the Air Force and DOE would be developed detailing these duties. The infrastructure operations at KAFB that could be affected by or be expected to directly support pit storage operations include security, vehicle and building maintenance, safety and health protection, utilities, administration, and general support (for example, cafeteria, general stores).

The direct impacts from the implementation of pit storage would include a small increase in the site's security force. Electrical usage due to long-term pit storage (estimated to be 4,110 megawatt-hours per year [MWh/yr])

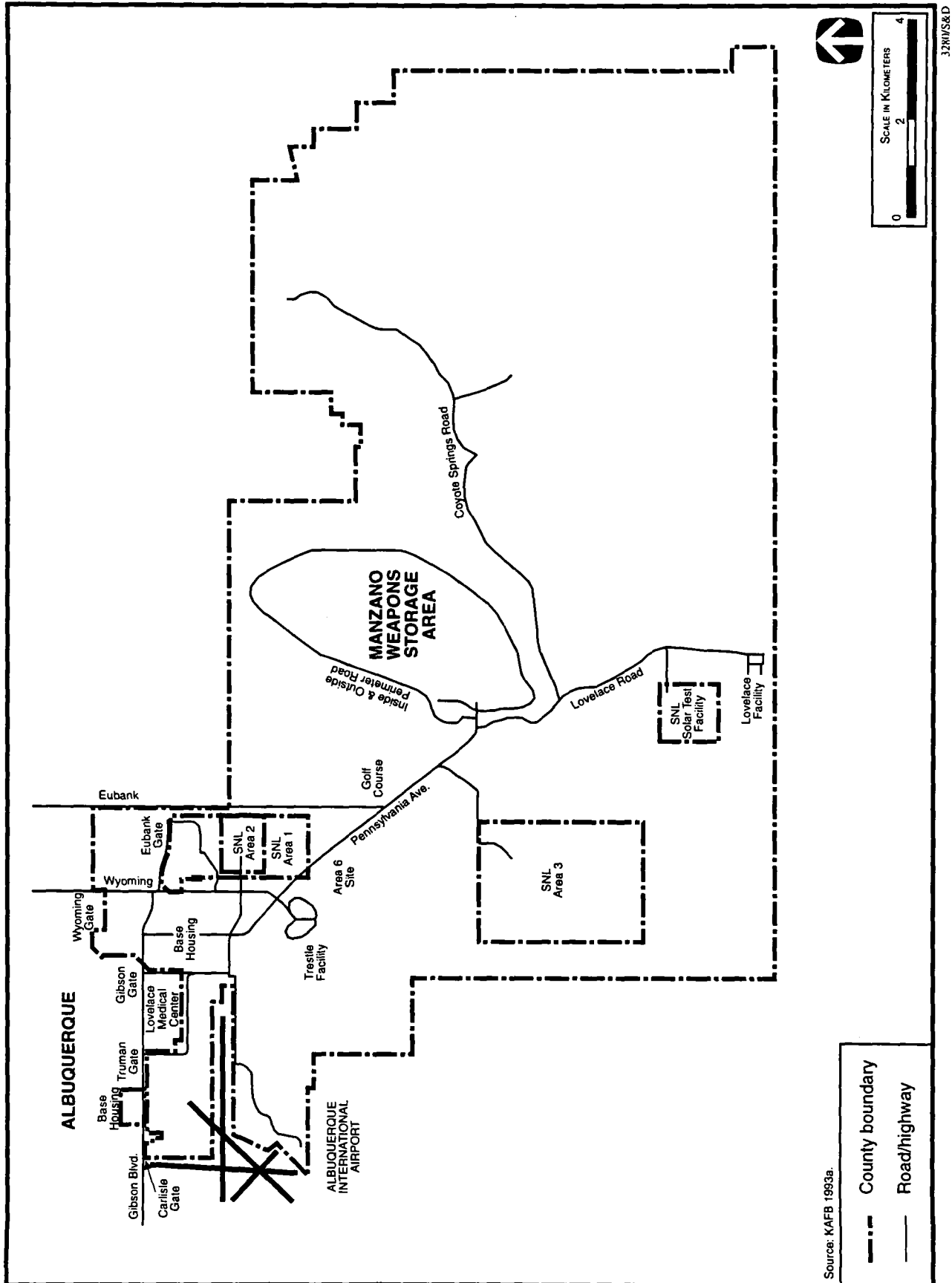
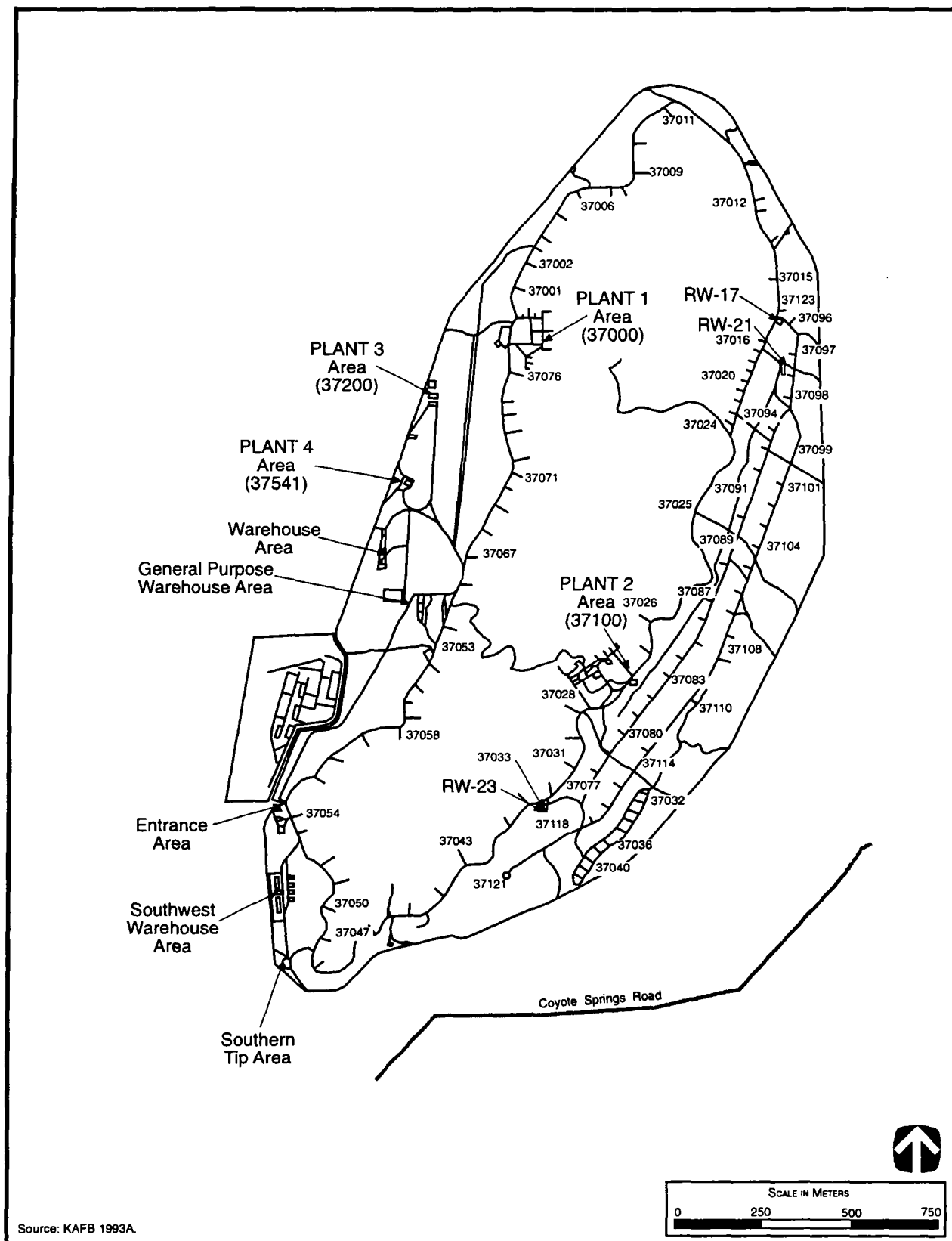


Figure P.1-1. The Manzano Weapons Storage Area at Kirtland Air Force Base, New Mexico.



3281/S&D

Figure P.1-2. Layout of the Manzano Weapons Storage Area at Kirtland Air Force Base.

represents a 0.8 percent increase over the site's fiscal year 1993 usage of 490,000 MWh/yr and 0.4 percent of the fiscal year 1993 system capacity of 1,095,000 MWh (USAF 1993a:3-17). Maintenance support and indirect impacts resulting from pit storage worker requirements (for example, water, wastewater treatment, and fuel) would increase minimally in comparison to the current and historical onsite infrastructure support levels and system capacities. The Manzano WSA is not currently being utilized at historical or design levels; therefore, the utility systems supporting this facility generally have excess capacity available to support pit storage activity.

P.2.3 AIR QUALITY AND NOISE

Since Manzano WSA is in a moderate nonattainment area for carbon monoxide (CO), air quality analysis is performed at a greater detail for this site. This section provides a more detailed analysis.

P.2.3.1 Air Quality Affected Environment

The Manzano WSA at KAFB is located in Bernalillo County, which is situated in the Albuquerque-Mid Rio Grande Intrastate Air Quality Control Region 152. The Manzano WSA lies outside the City of Albuquerque and is classified as better than national standards for sulfur dioxide, unclassifiable/attainment for ozone (O₃), unclassifiable for particulate matter less than or equal to 10 microns in diameter (PM₁₀), cannot be classified or better than national standards for nitrogen dioxide (NO₂), attainment for CO, and not designated for lead. For CO, Bernalillo County has not had a violation during the past 3 years. As of July 15, 1996, the Environmental Protection Agency (EPA) redesignated Bernalillo County from nonattainment to attainment for CO. The nearest Prevention of Significant Deterioration (PSD) Class I area to the Manzano WSA is the Bandelier Wilderness, approximately 80 kilometers (km) (50 miles [mi]) to the north. The Manzano WSA has no emission sources subject to PSD requirements.

P.2.3.2 Air Quality Environmental Impacts

There are no direct criteria pollutant emissions from the pits during storage. Indirect pollutant emissions would be produced from the exhausts of the vehicles used by employees used to commute to and from work. Also, exhaust emissions from the tractor-trailers used to transport the pits from Pantex to the Manzano WSA would contribute a small amount of pollution to the overall pollutant burden in Bernalillo County, NM.

The calculation of emission rates of exhaust pollutants from employee and pit delivery vehicles was made based on emission factors obtained from the EPA Mobile Source Emission Factor Model (MOBILE 5a). The following assumptions were used in calculating the exhaust pollutant emissions:

- 120 vehicles would be used by security employees (365 days/yr)
- 30 vehicles would be used by operations staff employees (255 days/yr)
- Average roundtrip commute distance: 48 km (30 mi)
- Pit delivery truck roundtrip distance from Pantex in Bernalillo County: 80 km (50 mi)

Table P.2.3.2-1 presents the estimated annual pollutant emissions from employee and pit delivery vehicles. A comparison of these emissions with those in Bernalillo County is also provided in the table. Table P.2.3.2-1 shows that the resulting increase in the CO emission due to storage of pits at the Manzano WSA would be 0.08 percent. Also, these emissions from mobile sources would be distributed over a relatively large area. The increases in the ambient concentrations would, therefore, probably not be detectable and would not cause an increase in the violations of the CO ambient air quality standard (Bernalillo County is currently an attainment area for CO). Nor would these negligible increases cause any violations of the National Ambient Air Quality Standards (NAAQS) for the other criteria pollutants. Also, these small emission increases would not slow

progress in attaining the CO standard. The air quality impacts resulting from the storage of pits at the Manzano WSA would therefore be negligible.

Table P.2.3.2-1. Pollutant Emission Rates Related to Storage of Pits at the Manzano Weapons Storage Area

Source	Pollutant Emission Rate		
	CO (kg)	NO ₂ (kg)	VOC (kg)
Employee Vehicles	19,940	3620	2,080
Pit Delivery Vehicles	40	50	10
Total	19,980	3,670	2,090
Bernalillo County (1993)	26,303	NA	NA
Percent of County Emission	0.08	NA	NA

Note: NA=emission factors not available.

Source: PX DOE 1996b.

P.2.3.3 General Conformity Determination

The EPA published the General Conformity Rule 40 Code of Federal Regulations (CFR) parts 6, 51, and 93 on November 30, 1993, to implement section 176(c) of the *Clean Air Act* (CAA) as amended in 1990. This section requires that Federal action conform to the appropriate State Implementation Plan. Conformity, as defined in the CAA, is conformity to the State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. A formal conformity determination is required for Federal actions occurring in nonattainment areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified annual de minimis (threshold) values. Because O₃ is a secondary pollutant, the conformity determination for O₃ uses the precursor emissions of volatile organic compounds and NO₂ as surrogate pollutants. The threshold values are presented in Table P.2.3.3-1. Since the Manzano WSA is in a maintenance for attainment area for CO, the threshold value for CO is 90.7 metric tons (100 short tons) per year (Table P.2.3.2-1). As shown in Table P.2.3.3-1, the emission rate for CO is well below the threshold value. Therefore, a general conformity analysis is not required for the Manzano WSA.

Table P.2.3.3-1. Threshold Values

Criteria Pollutant	Degree of Nonattainment	Emission Rate (kg)
Ozone (VOCs and NO ₂)	Serious	45,400
	Severe	22,700
	Extreme	9,100
	Other ozone nonattainment areas (outside of ozone transport region)	90,700
VOCs	Marginal/moderate nonattainment (within ozone transport region)	45,400
NO ₂	Marginal/moderate nonattainment (within ozone transport region)	90,700
CO	All	90,700
PM ₁₀	Moderate	90,700
	Serious	63,500
SO ₂ /NO ₂	All	90,700
Pb	All	22,700

Source: PX DOE 1996b.

P.2.3.4 Noise

The major sources of noise within KAFB include blasting and explosives testing, aircraft operations, and equipment and machine operations. The only additional sources of noise associated with pit storage operations would be from transportation vehicles. These impacts would be minimal.

P.2.4 WATER RESOURCES

Because of the nature of the pit storage activities, operations at the Manzano WSA would not affect surface water or groundwater. The pit storage activities would not use surface waters at the Manzano WSA. The Manzano WSA has several springs and seeps. Four springs are located on the mountains that make up the Manzano WSA (USCOE 1995b:22,23,27). Some magazines show evidence of water intrusion (KAFB 1993a:48). These magazines were designated as unsuitable for pit storage and would not be used. The sanitary sewer waste from the Manzano WSA would be discharged to approved septic systems. The wastewater would not have a measurable affect on groundwater quality because of the combined effects of a deep water table (15 to 30 m [50 to 100 ft]), low additional discharge volumes, high evaporation rates, and a composition and concentration consistent with treated and sanitary wastewater. The water demands of pit storage operations are solely due to use by storage personnel. The water demands would be less than historical usage at the Manzano WSA and negligible in comparison to the 6.4 billion liters (1.7 billion gallons) used annually at KAFB (USAF 1994a:3-20). The Manzano WSA is located outside of the 100-year and 500-year floodplains (USAF 1979a).

P.2.5 GEOLOGY AND SOILS

The only aspects of geology and soils resource area that could be affected by or have an effect on the implementation of long-term pit storage at the Manzano WSA are the risks associated with earthquakes. The earthquake risk was assessed and found to be bounded by other accidents, as discussed in Section P.2.9. The Manzano WSA is not anticipated to require upgrades that would involve land disturbance; therefore, impacts to soils are not anticipated.

P.2.6 BIOTIC RESOURCES

No Federally listed threatened or endangered plant and animal species have been reported from the Manzano WSA, although the peregrine falcon and the bald eagle may be occasional KAFB migrants (USAF 1994a:3-8, 3-9). However, three specimens of the grama grass cactus, a species of concern, were noted just west of the perimeter fence near the Manzano WSA administrative complex. The western burrowing owl, another species of concern, has been reported 1.6 km (1 mi) west of the Manzano WSA perimeter fence, but not within that facility's boundary. Additionally, two State endangered plants, the viznagita cactus and Wright's fishhook cactus, were found together on gravelly or rocky slopes at nine sites within the Manzano WSA (NM NHP 1995a:15,C-176,C-177). Further, four springs were identified within the perimeter of the Manzano WSA (USCOE 1995b:ES,15-27). However, the long-term storage of pits does not include any action that would disturb the animal or plant species noted above or any of the four springs. Therefore, no impacts to biotic resources would be expected.

P.2.7 CULTURAL RESOURCES

Twenty-seven historic and prehistoric archaeological sites have been found in the Manzano WSA. Of these sites, 8 have been recommended for inclusion in the National Register of Historic Places (NRHP) and 14 others are considered to be potentially eligible for inclusion (ANL 1995c:1-1,1-2,8-2-8-6). The storage of pits would not include any action that would disturb these resources. No storage facilities identified have been nominated to the NRHP. Therefore, no impacts to cultural and paleontological resources would be expected.

To identify areas of potential concern and locations, DOE has, in the past, sought consultations with Native American groups with traditional ties to the area. Two of these groups, the Sandia and Isleta Pueblos, expressed a general concern about the Manzano WSA. Isleta Pueblo considers the Four Hills area that comprises the Manzano WSA to be within their traditional area of cultural activities. They have requested that KAFB inform them of any archaeological finds at the Manzano WSA, specifically in regards to human remains and ritual objects (ANL 1995c:1-1,1-2). The long-term storage of pits is not expected to affect these concerns.

P.2.8 SOCIOECONOMIC RESOURCES

Approximately 150 additional personnel (including 120 security personnel) would be required to operate the storage magazines at the Manzano WSA if pit storage activities were moved to this facility. This number represents less than a 0.8-percent increase in the total Federal workforce at KAFB. Most of these workers could be hired locally; therefore, the increase to the KAFB workforce or the regional population would not be significant. According to the 1990 Census, 150 workers represent 0.06 percent of the of the workforce employed within the KAFB region of influence (ROI) (Census 1993m:202-205). No socioeconomic impacts would be anticipated.

P.2.9 OCCUPATIONAL AND PUBLIC HEALTH

The basic approach used in assessing human health concerns is to first identify the affected environments and establish a baseline that represents the risk from current operations. Changes in this baseline risk resulting from the long-term storage of pits are then examined for both normal operations and potential accidents.

In the Pantex EIS, the assessment of the human health risk impact from potential accidents that results from storing the pits in the Manzano WSA involved a risk screening process. The first step in this process was to identify a broad spectrum of potential accident scenarios. The second step in the process used screening techniques to identify the specific scenarios that dominate risk. Rigorous consequence evaluations are only performed for the identified risk-dominant scenarios.

Two types of accident consequences are examined:

- Worker and public exposure
- The probability of the accident causing fatal cancer in a worker or the public

If DOE chooses to relocate pits to KAFB, two aspects of this relocation contribute to a potential for environmental impacts. They are the impacts associated with the following:

- Transferring pits from the transporter to their storage location inside the facility
- Storage itself (for example, potential impacts resulting from having the pits reside inside the facility)

Each time pits are transferred from the transporter to their storage location inside the facility, there is a small probability that an accidental release could occur due to a handling accident. In addition, the transfer of pits from the transporter to their storage location would result in radiological exposures to involved workers.

P.2.9.1 Affected Environment

The release of radioactivity and toxic chemicals to the environment from a DOE facility is an important issue for onsite workers and the public. Since the human environment contains many sources of radioactivity and toxic chemicals, it is essential to understand the sources of these substances and how effectively they are controlled.

Table P.2.9.1-1 summarizes the major sources of radiation exposure in the vicinity of the Manzano WSA. The average annual probability of contracting a fatal cancer in the State of New Mexico is 1.4×10^{-3} . Using a nominal

Table P.2.9.1-1. Major Sources of Radiation Exposure in the Vicinity of the Manzano Weapons Storage Area at Kirtland Air Force Base

Source of Exposure	Dose to Average Individual (mrem/yr)	Percentage of Total Exposure
Natural Background Radiation		
Cosmic and external terrestrial	119	84.8
Internal terrestrial	39	
Radon in home	200	
Total natural	358	
Medical Radiation		
Diagnostic x rays	39	12.6
Nuclear medicine	14	
Total medical	53	
Other Sources		
Weapons test fallout	<1	2.6
Consumer and industrial products	10	
Air travel	1	
Nuclear facilities (other than transportation of radioactive materials)	<1	
Manzano/Sandia-environmental radioactivity	4×10^{-8}	
Total other	11	
Total (All Sources)	422	100

Source: NCRP 1987a.

fatal cancer risk factor of 5×10^{-4} cancer fatalities per person rem and the environmental radioactivity data for Manzano/Sandia in Table P.2.9.1-1, it is calculated that fatal cancers attributable to environmental radioactivity released in the vicinity of the Manzano WSA and SNL constitute an extremely small fraction (<0.01 percent) of the average yearly fatal cancer probability in the State of New Mexico (NM DOH 1995a:1).

Figure P.2.9.1-1 depicts the offsite population within an 80-km (50-mi) radius of the Manzano WSA. Windspeeds and directions in the Manzano WSA vicinity are presented in Figure P.2.9.1-2. Winds are predominantly southerly during the summer and northerly during the winter.

P.2.9.2 Environmental Impacts

Human health impacts from pit storage activities could potentially result from normal operations and accident scenarios. Impacts from normal operations would be confined to onsite workers. Normal operational impacts result from the unloading of pits from safe, secure trailers (SSTs) at the Manzano WSA. Unloading operations would result in radiological exposure to cargo handlers. Based on conservative calculations made for handling of pits at Pantex Plant, the worker doses from unloading of 2,000 pits per year are estimated to be 27 person-roentgen equivalent man (rem) per year or 270 person-rem for the unloading of pits. Once removed from the SSTs, pits would be transferred into the Manzano WSA for storage. Pit transfers within the Manzano WSA would result in radiological exposures to onsite workers handling the pits. The transfer of pits would result in worker doses of less than 2 person-rem per year for handling 2,000 pits and 13 person-rem for the placement of pits. The combined worker dose from unloading and storage of pits at the Manzano WSA would be 283 person-rem distributed over the 30 people directly involved in material movement. Over a period of

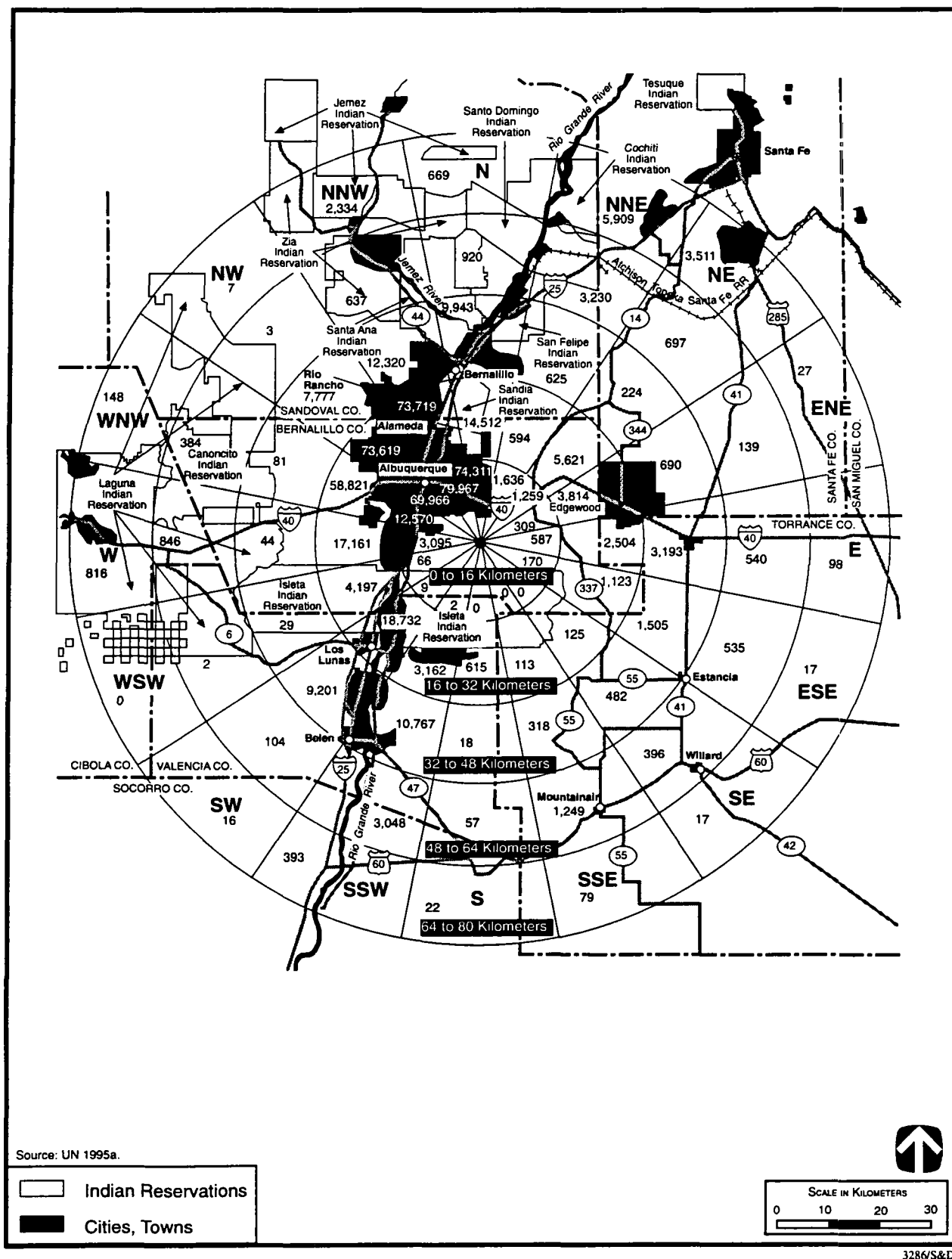
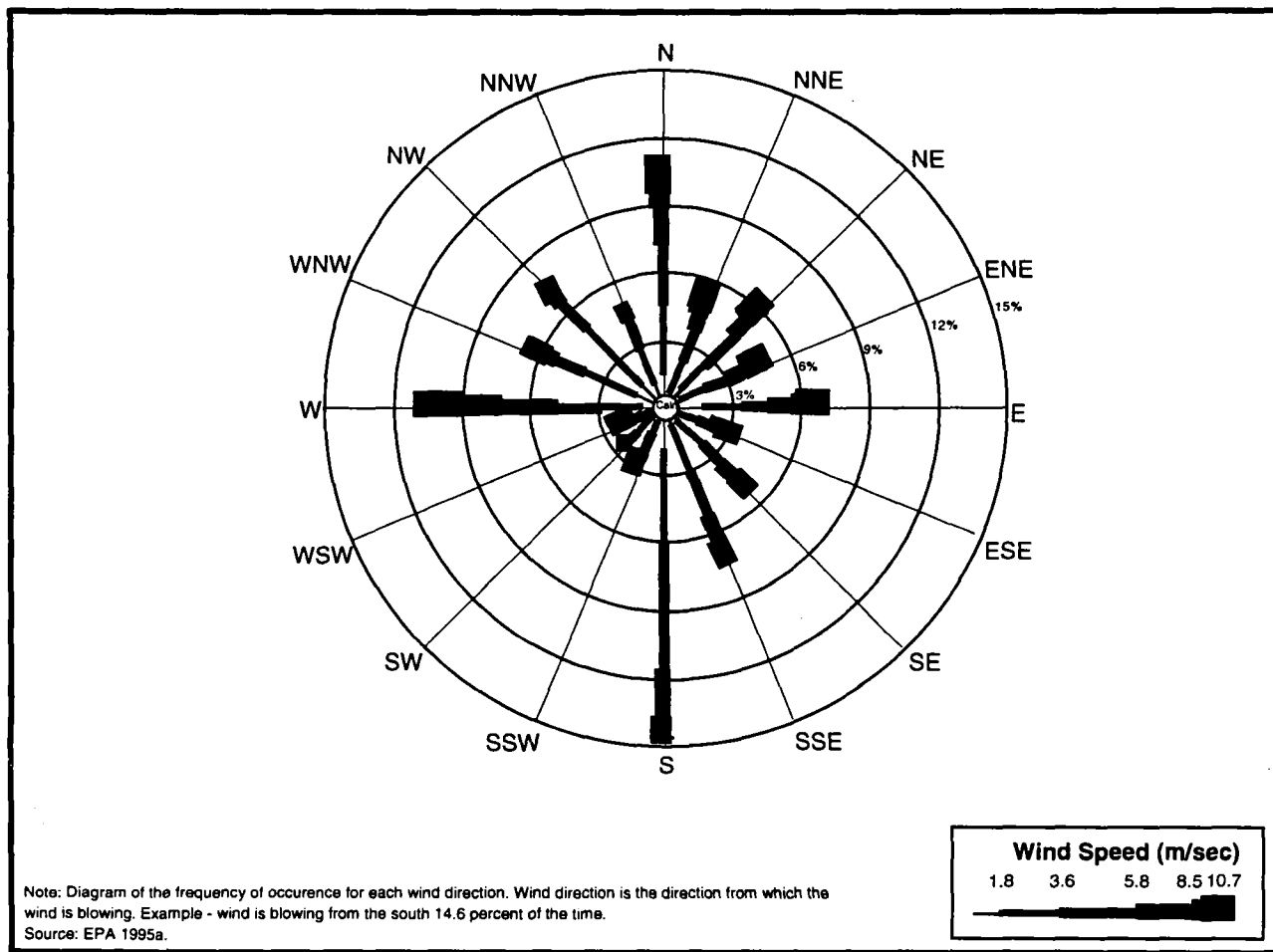


Figure P.2.9.1-1. Offsite Populations in the Vicinity of the Manzano Weapons Storage Area.



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Figure P.2.9.1-2. Wind Direction and Speed at Albuquerque International Airport.

10 years and using a dose-to-risk conversion factor of 4×10^{-4} latent cancer fatality (LCF) per person-rem, there would be an additional 0.11 LCF experienced by this group due to radiological exposure from pit handling. For long-term storage, over a period of 50 years, assuming the handling of 2,000 pits per year and no movement to or from the WSA, there would be an addition 0.04 LCF experienced by the workers.³

Some operational accidents could result in impacts to both onsite workers and the offsite general population. Radiological exposures and the resultant risk of latent cancers have been evaluated. The probability of an onsite worker or an offsite member of the general public contracting a fatal cancer resulting from accidental radiological exposure was calculated using the Melcor Accident Consequence Code System (MACCS) computer code.

The radiological health risk from accidents associated with the storage of pits is dominated by handling accidents that could occur when the pits are being transferred from the transporter. A standard tine forklift is likely to be used to remove pit containers from an SST. The probability of a standard tine forklift causing a puncture during a single handling operation is in the range 10^{-4} to 10^{-6} (that is, extremely unlikely as defined by DOE orders). It is estimated that a forklift puncture of a pit container would release 9.2×10^{-5} curies of Pu.

³ For the Preferred Alternative, surplus Pu material would not be stored for 50 years but until disposition occurs.

This is a conservative estimate of the respirable, airborne release caused by a puncture of one shipping container (PX DOE 1992f:7-39).

Given such a release, an involved worker (the forklift driver) would receive a dose of 6.6 rem, corresponding to an incremental increase in an LCF of 2.6×10^{-3} . In addition, a noninvolved worker 100 m (328 ft) downwind along the center line of the Pu dispersion plume would receive a 5.2×10^{-2} rem exposure, corresponding to an incremental increase in an LCF of 2.1×10^{-5} . The maximally exposed individual of the public would be expected to receive an exposure of 6.7×10^{-3} rem, corresponding to an incremental increase in an LCF of 3.4×10^{-6} .

This event would result in an exposure of 4.0×10^{-2} person-rem to the public within 50 km (80 mi). Considering the likelihood and consequence of this event, on the average, a member of the public will have an increased annual risk of developing a fatal cancer from this potential accident of 2.6×10^{-14} fatal cancers per year. The annual fatal cancer risk to a person in the State of New Mexico from all other causes is 1.4×10^{-3} fatal cancers per year.

Pit container inventories at the Manzano WSA are expected to be performed using either shielded or automated techniques and equipment. Consequently, these normal operations are not expected to result in any significant radiological exposure to workers.

P.2.9.3 Aircraft Accidents

The Manzano WSA is located in the foothills of the Manzano Mountains, approximately 6.5 km (4 mi) southeast of the main (east-west) runway of the Albuquerque International Airport. Figure P.1-1 shows the locations of the Manzano WSA relative to the two runways for the Albuquerque International Airport, one of three airports in the vicinity of the Manzano WSA. The Albuquerque International Airport is the major commercial airfield in the State of New Mexico; it is the only airport with regular commercial jet service. In addition to its role as a commercial airfield, the Albuquerque International Airport is utilized by military aircraft stationed at Kirtland Air Force Base. In 1994, the Albuquerque International Airport had 220,914 aircraft operations (takeoffs and landings) (FAA 1996a:1). Table P.2.9.3-1 summarizes the total number of airfield operations at the Albuquerque International Airport.

In addition to the Albuquerque International Airport, there are two other airports within the Albuquerque area. Coronado Airport is located approximately 19 km (12 mi) to the north-northwest, has two runways, and is used by general aviation aircraft. Similarly, Alameda Airport is located approximately 24 km (15 mi) to the northwest, has two runways, and is also used by general aviation aircraft. Both of these airports are outside the boundary for general aviation aircraft and were therefore not included in the aircraft crash analysis. Only the Albuquerque International Airport and nonairport (in-flight) aircraft were included in the analysis.

Table P.2.9.3-1. Albuquerque International Airport Operations for 1994

Aircraft Type	Number of Operations
Air Carrier	77,978
Air Taxi	41,349
Military	29,929
General Aviation	71,658
Total Airfield Operations	220,914

Source: FAA 1996a:1.

In the history of the Manzano WSA, there have been three aircraft crashes. One crash involved an F-100C; the crash site is located east of the Manzano administration area. Another crash involved a B-29 in the northern portion of the site. This aircraft departed from Kirtland Air Force Base and crashed after approximately

3 minutes in flight, killing the crew. The third crash also occurred in the northern portion of the site and involved an EC-135 (KAFB 1993a:69,73,74). None of these crashes affected the storage facilities.

If DOE chooses to relocate pits to the Manzano WSA, the pits would be stored in Type D magazines. Type D magazines (as shown in Figure P.2.9.3-1) have access tunnels that vary in length from 20 m to over 30 m (65 ft to over 100 ft). The main chambers are approximately 19 m (61 ft) long and have the capacity to store up to 800 pit containers each in a Stage Right configuration using a shielded forklift to stack containers. In addition, the main chambers are protected by two vaultlike steel doors at both ends of the access tunnel.

Type D facilities are tunneled into the mountainside, which provides significant earth overburden protection from penetrating aircraft. As many as 35 magazines have overburden greater than 9 m (30 ft) and are potentially available for pit storage. The frequency of an aircraft impacts at the Manzano WSA is relatively high compared with other potential storage sites. However, the earth overburden of Type D magazine provides complete protection against potential damage from aircraft impacts.

At Manzano, the potential exists for airplanes overflying the area to be carrying conventional bombs. An analysis was performed to determine whether expected bomb loads (one to four 909-kg [2,000-lb] bombs) could damage the Manzano storage magazines in the event of an airplane crash. With the minimum overburden cover of 9 m (30 ft) of granite and earth, the magazines cannot be damaged by any foreseeable aircraft events (Army 1986a: 3-19).

Using the Final DOE Standard for determining the probability of aircraft crashes and 1994 data from the FAA, the frequency of hitting one of the 25 Type D magazines was calculated as 8.8×10^{-5} for all types of aircraft (*DOE Standard, Accident Analysis for Aircraft Crash into Hazardous Facilities, SAFT-0030*). It should be noted that the frequency calculation represents a conservative upper bound. Since this frequency is greater than 1×10^{-7} , the Final DOE Standard stated that further analysis was needed. A structural analysis was done according to the Final DOE Standard for the facility with a 9-m (30-ft) overburden. The analysis was done for the maximum penetrator missile for each of the aircraft categories except for helicopters. None of the aircraft missiles penetrated the facility. Since this frequency is 0, the DOE Standard stated no further analysis was needed.

P.2.10 WASTE MANAGEMENT

For the purpose of this assessment, it is assumed that DOE's SNL would manage the wastes from pit storage at the Manzano WSA. Waste management figures from SNL are used for comparison. SNL manages mixed transuranic waste, transuranic waste, mixed waste, low-level waste, hazardous waste, and nonhazardous wastes in accordance with the requirements of a number of Federal and State regulations, permits obtained under these regulations (for example, New Mexico unilateral FCC order) and DOE Orders. These requirements are primarily under the authority of the EPA, DOE, and the New Mexico Environment Department. SNL generated an estimated 90 cubic meters (m^3) (110 cubic yards [yd^3]) of low-level waste and an estimated 1.7 m^3 (2 yd^3) of mixed waste in 1994. In addition, SNL currently stores approximately 70 m^3 (90 yd^3) of mixed waste onsite (DOE 1995cc:6-4; DOE 1993j:3-71). The new Radioactive Mixed Waste Management Facility for handling these wastes is due to become operational in the near future. SNL generated 751 m^3 (198,450 gal) of liquid and 127 m^3 (166 yd^3) of solid hazardous waste in 1991 (DOE 1993j:3-71). The pit storage operations would generate less than 1 m^3 (1.3 yd^3) of mixed, low-level, and hazardous wastes. Compared to the amounts of waste generated and stored at SNL, the wastes generated by the pit storage activities would be minimal and would not impact the current waste management at SNL.

P.2.11 INTRASITE TRANSPORTATION

Interstate 40 and Interstate 25 provide access to the Albuquerque metropolitan area. Access to KAFB from Interstate 40 is provided from either the Wyoming or Eubank gate entrances (Figure P.1-1). Access to KAFB from Interstate 25 is via Gibson Boulevard.

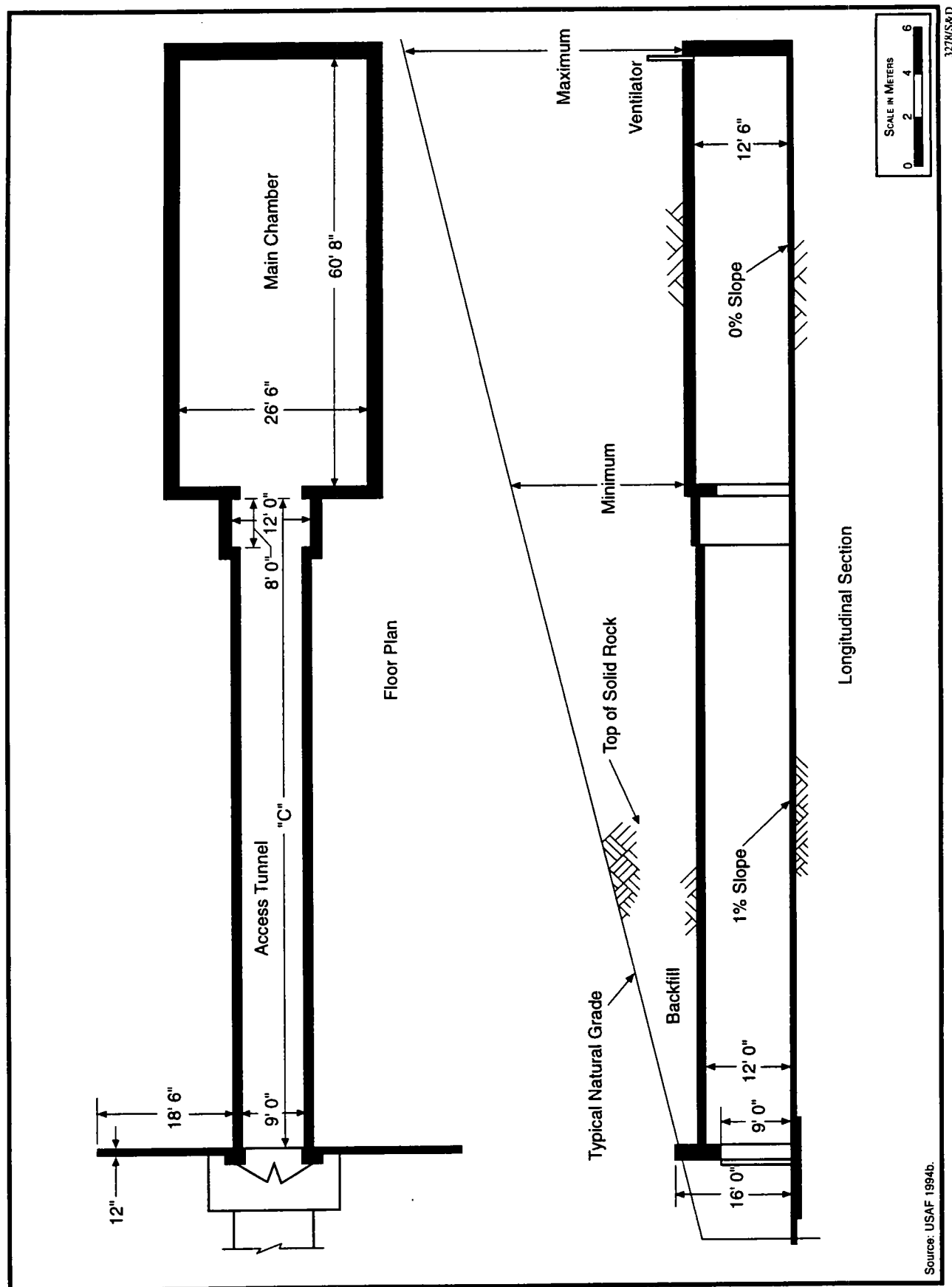


Figure P.2.9.3-1. Type D Storage Facility at the Manzano Weapons Storage Area.

The onsite road system at KAFB consists of paved streets and access roads. The Manzano WSA is located on the east side of KAFB. Access to the Manzano WSA is via Pennsylvania Avenue. The Manzano WSA is surrounded by fencing. Access to facilities within the area is provided via a ring road that encircles the mountain (Figure P.1-2). Traffic within the KAFB boundaries is strictly controlled, and the roads are not open to public traffic. Base personnel traffic would be controlled as SST convoys pass through the base roads. Because a release of Pu from an intersite pit shipment would require a severe accident (for example, an accident with a fuel tanker or a train), the controlled transportation environment at KAFB does not pose a significant threat to pit shipments. Consequently, the contribution to overall intersite transportation accident risk from onsite transport is negligible.

Two high speed transportation corridors (Gibson and Tijeras Arroyo corridors) that would traverse KAFB have been proposed. Of these, the Tijeras Arroyo Corridor would come in closest proximity to the Manzano WSA. Both transportation routes have been discussed for a number of years. However, *National Environmental Policy Act* documentation has not been completed on either project.

P.2.12 ENVIRONMENTAL JUSTICE

P.2.12.1 Affected Environment

The Manzano WSA is located on KAFB, which is adjacent to the southeastern city limits of Albuquerque, in central New Mexico. Besides the Air Force and other Department of Defense facilities, KAFB is also the location of various DOE operations, including SNL. Nearly 20,000 military and civilian personnel work on the base (KAFB 1995a:14). In order to identify the populations covered by Executive Order 12898, an 80-km (50-mi) radius circle centered on the Manzano WSA was overlaid on 1990 Census tract maps. The communities that lie within the 80-km (50-mi) ROI are shown in Figure P.2.12.1-1.

According to the 1990 Census, there were 606,446 persons within the Manzano ROI. White persons comprised 55 percent of the population, Hispanics were the second largest group with 37 percent, and Native Americans accounted for just over 4 percent of the total population. Native American reservations and trust lands belonging to 10 Native American tribes are located within the Manzano ROI, and approximately half of the Native Americans counted in the area in 1990 resided on Native American land. Blacks, Asians, Pacific Islanders and other racial groups totaled less than 4 percent of the total population in 1990 (UN 1995a).

Most of the population in the Manzano ROI resides in various cities, towns, and Census Designated Places. Albuquerque is the most populous community, with 384,736 persons or 63 percent of the total population within the Manzano ROI in 1990. An unincorporated area known as the South Valley, located immediately southwest of Albuquerque and due west of KAFB, is the second largest community in the area, with a 1990 population of 35,701. More than 70 percent of residents in the South Valley were Hispanic. Rio Rancho, northwest of Albuquerque in south-central Sandoval County, is third largest, with 32,505 persons in 1990. North and south of Albuquerque, along the Rio Grande River, are a number of towns and villages, most with primarily Hispanic populations: Belen (5,960 persons in 1990, 67 percent Hispanic), Bernalillo (5,960 persons, 75 percent Hispanic), Bosque Farms (3,791 persons, 25 percent Hispanic), Corrales (5,453 persons, 27 percent Hispanic), Los Chaves (3,872 persons, 49 percent Hispanic), Los Lunas (6,013 persons, 58 percent Hispanic), Tome-Adelino (1,695 persons, 65 percent Hispanic), and Valencia (3,917 persons, 47 percent Hispanic) (Census 1992b:11-21). Most of these communities are also characterized by fairly large low-income populations. For example, Belen had 28 percent of its population below the poverty level, Bernalillo had 24 percent below the poverty level, Los Chaves had 19 percent below the poverty level, Los Lunas had 25 percent below the poverty level, and Valencia had 15 percent below the poverty level (Census 1993m:516-520).

There are also nine primarily Native American communities in the Manzano ROI. A major portion of the northern boundary of the Isleta Indian Reservation borders the southern boundary of KAFB, but the Isleta people (2,699 in 1990) primarily live near the Rio Grande River, several miles from the KAFB boundary. In the

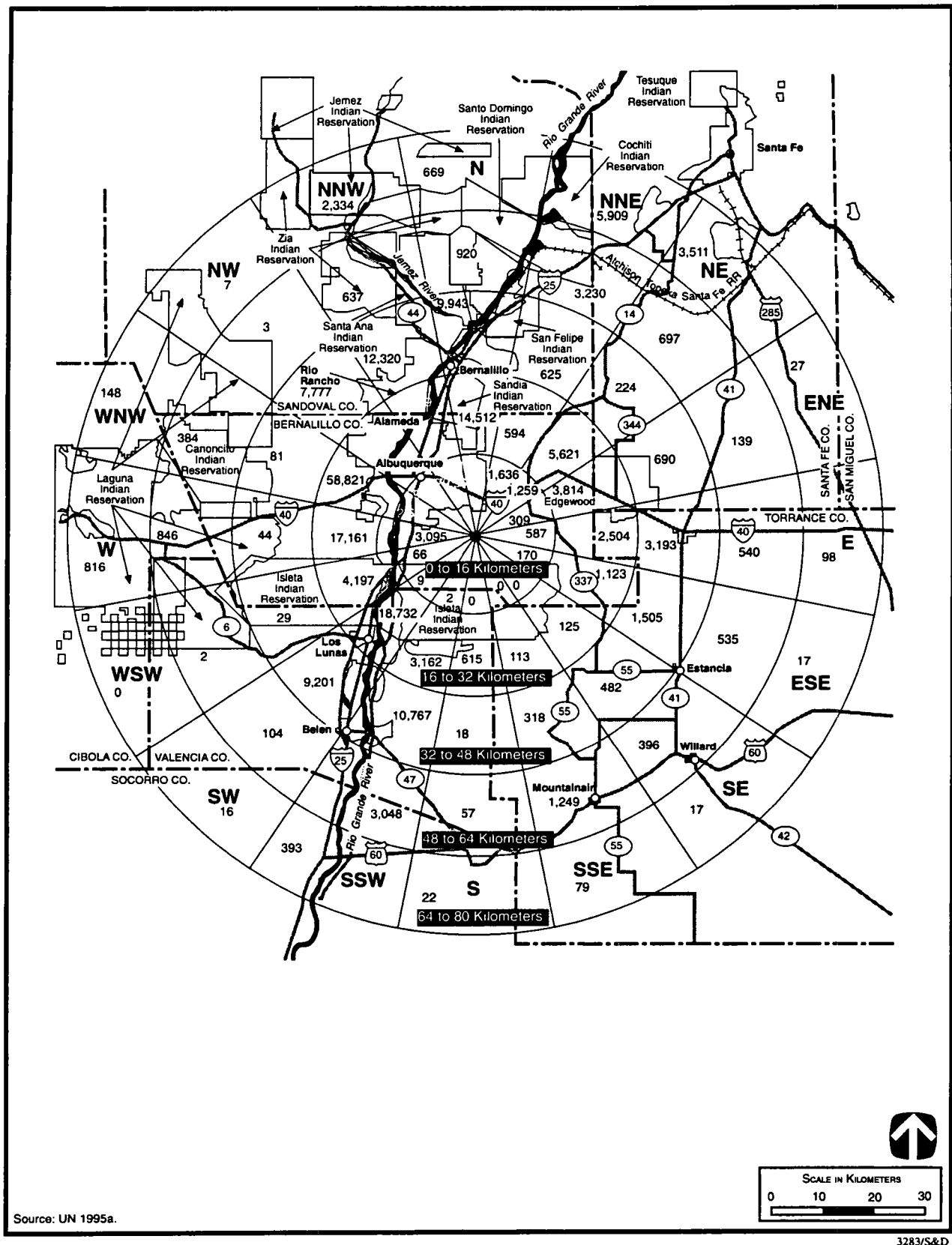


Figure P.2.12.1-1. The Manzano Weapons Storage Area Region of Influence.

Sandoval County portion of the Manzano ROI are seven additional Native American reservations with persons residing in dense settlements known as Pueblos: Sandia Pueblo with 358 Native American residents in 1990; Santa Ana Pueblo with 481 Native American residents; San Felipe Pueblo with 1,859 Native American residents; Santo Domingo Pueblo with 2,947 Native American residents; Cochiti Pueblo with 666 Native American residents; Zia Pueblo with 637 Native American residents; and Jemez Pueblo with 1,738 Native American residents. In the northwest corner of Bernalillo County is the Canoncito Navajo Reservation, a satellite of the main Navajo Reservation, with 1,060 Native American residents counted in 1990 (Census 1991h:60,61). The most notable socioeconomic characteristic of these communities is their large numbers of low-income persons. The percentage of persons below the poverty level based on 1989 incomes found on these reservations were: Isleta, 27 percent; Sandia, 19 percent; Santa Ana, 13 percent; San Felipe, 42 percent; Santo Domingo, 34 percent; Cochiti, 25 percent; Zia, 33 percent; Jemez, 37 percent; and Canoncito, 60 percent (Census 1993m:622-625).

Figure P.2.12.1-2 shows 1990 Census tracts within the Manzano ROI. The tracts are shaded if minority populations comprised 25 percent or more of the populations in 1990 or if 25 percent or more of the persons in a tract were below the poverty level based on their incomes in 1989. The 25 percent threshold levels for minority or low-income persons are based on the working definitions contained in the notice of the EPA's Office of Environmental Justice (59 FR 50757).

Virtually every tract in the Manzano ROI had a population in 1990 in which at least 25 percent of persons were minority or non-Whites. The major exceptions were the southernmost tract in Santa Fe County, 4 tracts in Rio Rancho in southcentral Sandoval County, and 25 tracts located primarily in the northeastern quadrant of Albuquerque, including the Four-Hills Tract located just north of the Manzano WSA.

Low-income persons were not nearly as prevalent in the Manzano ROI in 1990 as were minority persons. High levels of poverty found in Native American communities account for the shaded tracts in rural Sandoval County, eastern Cibola County, and western and southern Bernalillo County. The tracts shaded for low-income persons in rural Socorro, Valencia, Torrance and San Miguel Counties are also areas with largely Hispanic populations. In the Albuquerque area, high poverty levels were found primarily in the southern half of the city, with the greatest concentration of low-income persons situated in the southwest quadrant, in the unincorporated area known as the South Valley, with its 73-percent Hispanic population (Census 1992b:11-21).

P.2.12.2 Environmental Impacts

Because the long-term storage of pits at KAFB would not require any construction activities and because all facility modifications would take place inside existing facilities, impacts to the natural environment would be minimal. Under normal operating conditions, a minor increase in PM_{10} concentrations would be expected from the operation of forklifts that are used to move the pits from the unloading area to the storage area. These impacts are not likely to affect the surrounding population. Radiological releases from normal pit storage operations would have no measurable effect on an individual occupying a position near the KAFB boundary for an entire year. Levels at the site boundary would be indistinguishable from natural background radiation. No health effects would be expected among the general public, including minority and low-income populations, as a result of normal storage operations.

An abnormal event, such as accidental puncture of a storage container by a forklift, has the potential of exposing the general public to radiation. The analysis in Section P.2.9, indicates that the risk to the public from such an accident would be negligible. With no measurable impacts on the general population, the minority and low-income populations would not be disproportionately impacted.

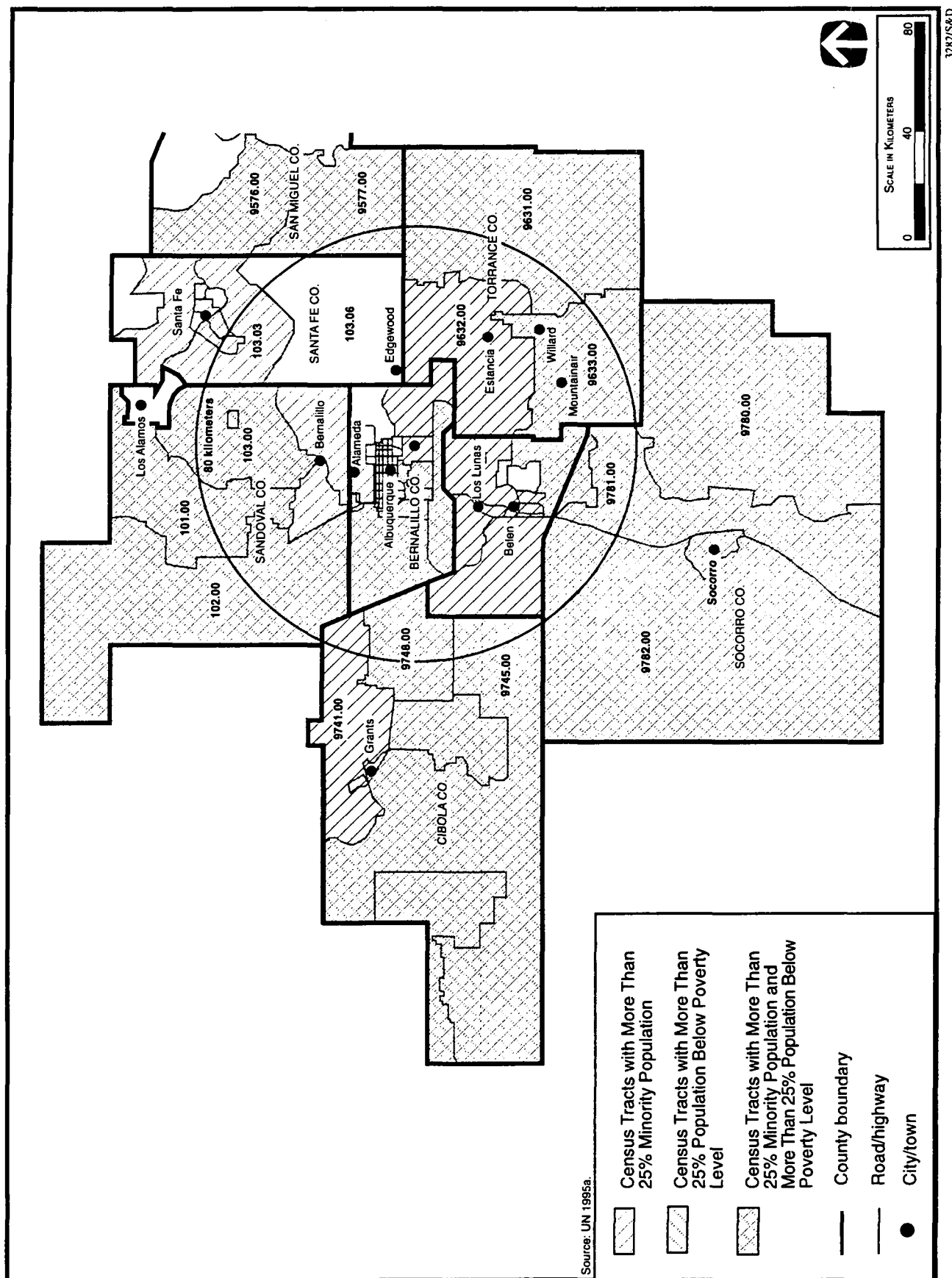


Figure P.2.12.1-2. Minority and Low-Income Populations in the Manzano Weapons Storage Area Region of Influence.